

1 Introduction

1.1 The reason behind this book

The main reason is the revised approach to the design of adhesively bonded strengthening measures for concrete members given in the guideline [1] (q.v. [2]) published by the Deutscher Ausschuss für Stahlbeton DAfStb (German Committee for Structural Concrete). This book explains the design rules of the DAfStb guideline, together with their background, and uses examples to illustrate their use. The scope of the explanations and background information provided here is mainly based on works that have already been published. However, some rules that so far have been dealt with in detail in committee meetings only are elaborated here for the first time.

1.2 Strengthening with adhesively bonded reinforcement

The strengthening of concrete members means using constructional measures to restore or improve their load-carrying capacity, serviceability, durability or fatigue strength. The effects of strengthening measures can generally be described in quantitative terms and therefore analysed numerically. Besides numerous other methods (see [3, 4], for example), the subsequent strengthening of existing concrete members can be achieved by using adhesives to bond additional reinforcing elements onto or into those members. This topic of reinforcement bonded with adhesive has been the subject of many contributions to various editions of the *Beton-Kalender* in the past (see [5, 6]). However, design approaches for adhesively bonded reinforcement have continued to evolve (see [7, 8]) and the new DAfStb guideline [1, 2] on this subject revises those design methods and adapts them to our current state of knowledge. In principle, the DAfStb guideline together with a corresponding system approval allows the following concrete member strengthening measures to be carried out:

- Flexural strengthening with externally bonded (surface-mounted) CFRP strips, CF sheets and steel plates
- Flexural strengthening with CFRP strips bonded in slots (near-surface-mounted reinforcement)
- Shear strengthening with externally bonded CF sheets and steel plates
- Column strengthening with CF sheets as confining reinforcement.

Figure 1.1 provides an overview of these methods. The term ‘adhesively bonded’ is used in this book as universal expression comprising both methods ‘externally bonded’ and ‘near-surface-mounted’.

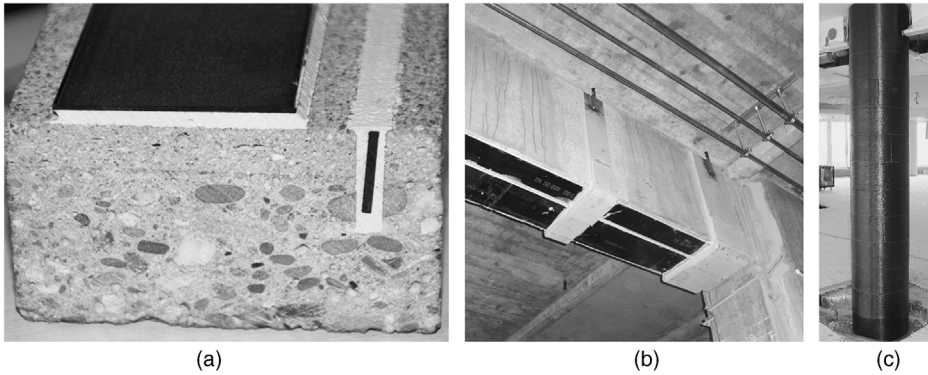


Fig. 1.1 (a) Externally bonded and near-surface-mounted CFRP strips; (b) flexural strengthening with externally bonded CFRP strips together with shear strengthening in the form of externally bonded steel plates (photo: Laumer Bautechnik GmbH); (c) column strengthening with CF sheets as confining reinforcement (photo: Laumer Bautechnik GmbH)